



THE GROWTH OF SIX RICE VARIETIES BETWEEN THREE YEARS AGE *HEVEA*

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Abstract

This study aims to achieve two main things simultaneously, namely formulating an intercropping cultivation technique so as to increase the income of Hevea farmers and contribute *hevea* plantations to independent food supply. The method used in this research is a field research design. Planting *Hevea* with 1 clone, namely PB 260, combined with 6 rice varieties, namely Impago 7, Rindang 1, Rindang 2, Sibundong, Hamparan Perak and MSP 17. with 3 replications. Each variety was planted in 1 x 1m plots, in 3 year old *Hevea* plantations. The goal to be achieved in this research is to obtain a technology package based on Hevea cultivation to optimize growth and indicate varieties that are resistant to shade. in the long run, this research encourages the importance of finding shade tolerant varieties. On the other hand, the development of this research plot will encourage other intercropping studies, namely Hevea with coffee and cocoa plantations so that in the long term it is profitable for Hevea farmers and adds value to the concept of agricultural agroecology. From a growth perspective, the varieties Rindang 1 and 2 and Hamparan Perak have the potential to be cultivated on Hevea TBMs aged 3 years.

Keywords: *Variety, Hevea, Shade, Intercropping, Growth*

1. INTRODUCTION

Red rice-producing rice can be cultivated by intercropping on plantations considering that the area of Immature Plantation (*Hevea* TBM) is generally open, which can be utilized (1,4,8). Research on various intercropping plants in Hevea plantations generally describes various annual crops, as reported by (9). Chilies, tomatoes, eggplants and even the provision of Hevea seeds in the Hevea plantations provide additional income of up to Rp. 7 million per month within 3 years. This shows that there is space in the Hevea plantation area that has the potential to be managed. According to (10) in preparing the projected financing for replanting Hevea plantations for farmers, he also explained the possibility of planting corn and rice as one of the efforts to earn farmers' income. In the Philippines, (6) concluded that Hevea intercropping technology with legumes could increase the income of Hevea farmers. (8) states that rice farming as a Hevea intercrop is still profitable when prices are low with an R/C ratio of 1.46, whereas when prices are high it is very profitable with an R/C ratio of 1.94. This shows that rice farming as a Hevea intercrop is economically profitable and feasible to develop, especially in smallholder Hevea areas (9,10).

2. RESEARCH METHOD

The research was carried out at the Experimental Garden of the Sungei Pti Research Institute – Rubber Research Center (North Sumatra). The research started in December 2021, which began with processing the yards a month before planting. The experiment was carried out by planting 6 varieties of rice, namely Impago 7, Rindang 1 and Rindang 2, Sibundong, Hamparan Perak and MSP 17. Each variety was planted on an area of 1 x 1 m, repeated 3 times in 3-year-old

Hevea plantations. Paddy planting distance is 20 x 20 cm, 1 m away from the row of Hevea plants. Hevea plants were planted 5 x 4m apart, clone PB 260 (11). Parameters that observed were rice plant height, number of tillers, and environmental conditions of planting. Production parameters were also observed, which are reported separately in different articles.



Figure 1. Research site

3. RESULTS AND DISCUSSION

3.1.Environmental conditions

Table 1 shows that the pH of the soil in the study area was close to normal (&), which means that from a chemical aspect, the interstellar soil is suitable for planting land rice. This feasibility is probably due to changes in soil pH due to ideal pre-*Hevea* planting soil processing, so that the soil acidity level can be overcome (5). On the other hand, root fungal diseases were not found, so their control using sulfur was not carried out. As is known, sulfur has the potential to lower soil pH. The temperature at the study site, which is below the canopy, is 34⁰ C, while the light intensity is in the range of 230 – 713 lux. Although this is an indication of canopy shade conditions, visually it appears that the Hevea tree canopy is generally thin as a result of the effects of natural leaf fall and prolonged leaf disease. In other words, the temperature and light intensity under this canopy are not a complete picture of the condition of the healthy crown of a 3-year-old Hevea plant.

Table 1. Environmental parameters of the rice-Hevea planting area

variety	soil pH	°C	Light Intensity (Lux meter x100)	
			Lowest	Highest
Inpago 7	6,2	34		
Leafy 2	6	34		
Sibundong	6	34		
Leafy 1	6	34	230	713
Silver Expanse	6,5	34		
MSP 17	5,5	34		



3.2. Plant height

From Table 2 it can be seen that the Hamparan Perak variety showed the highest growth when compared to the growth of other varieties. In the first and second years, the varieties that were also tested in *Hevea* plantation areas aged 1 and 2 years did not grow optimally. Growth in height is relatively low, but the increase in the number of tillers in both years is high. This is a strong indication that the Hamparan Perak variety is an ideal local variety to be cultivated when the *Hevea* plants are 3 years old. The growth of the Rindang 1 and Rindang 2 varieties in terms of height gain in the 2 periods (20 and 50 Days After Planting, DAP) was very good, namely 44.77 cm and 46.30 cm respectively. This height increase is still equivalent to the height increase in the Overlay Silver variety (44.18 cm). As the varieties recommended by the Rice Research Center can grow well in shaded conditions, both are also potential for cultivation in the TBM (Immature) *Hevea* plantations.

Table 2. Plant height at 20 and 50 days after planting and its increase

variety	20 DAP*			verage	50 DAP			Average	Increase (cm)
	Replicati on 1	Replicati on 2	Replicati on 3		Replicati on 1	Replicati on 2	Replicati on 3		
	Average	Average	Average		Average	Average	Average		
Inpago 7	15,25	20,22	16,62	7,36	54,45	53,58	65,23	57,76	40,39
Leafy 2	13,23	14,97	13,65	3,95	59,77	59,63	61,35	60,25	46,30
Sibundong	20,73	20,87	20,78	0,79	59,97	66,37	65,23	63,86	43,06
Leafy 1	16,52	17,42	15,40	6,44	56,53	63,02	64,08	61,21	44,77
H. Perak	20,75	26,28	24,60	3,88	61,27	75,68	67,23	68,06	44,18
MSP 17	16,68	18,20	18,97	7,95	59,65	65,72	66,05	45,86	45,86

*DAP = Days After Planting



Figure 1. Location of testing varieties in *Hevea* plantations



Figure 2. One of the varieties tested: Hamparan Perak, a local variety

3.3. Number of puppies

From Table 3 it can be seen that the Inpago 7 variety grew with the lowest number of tillers, as did the Rindang 1 and Hamparan Perak varieties, which had an average of 2 tillers, at 20 HST. However, at 50 DAP, the three varieties produced a high number of tillers, namely an average of 13 tillers. This gives a strong indication that the superior variety Rindang 2 (7) and the local variety Hamparan Perak have potential in terms of the growth in the number of tillers when cultivated in Hevea trees aged 3 years. The large number of tillers, on the other hand, will provide additional organic matter in the Hevea plantations (3).

Table 3. Number of tillers at 20 and 50 days after planting and their increase

variety	20 HST			vera ge	50HST			Average	Increase (saplings)
	Replicati on 1	Replicati on 2	Replicatio n 3		Replicati on 1	Replicati on 2	Replication 3		
	Average	Average	Average		Average	Average	Average		
Inpago 7	1.33	3.00	4.00	,78	17,83	9,33	12.50	13,22	10.44
Leafy 2	1.33	2.50	5,33	.06	10.83	11.67	11.67	11.39	8.33
Sibundong	1.67	3,33	4,17	.06	8.50	9,33	10.50	9,44	6,39
Leafy 1	2,33	3,33	3.00	.89	10.00	1.00	11.50	10.83	7,94
H. Silver	2.67	2.67	3,33	.89	9,33	17.00	14.83	13.72	10.83
MSP 17	3.00	3,33	4.00	,44	14.00	14.83	16.00	14.94	11.50

Information ; HST = Days After Planting

3.4. Pests and diseases

The biggest obstacle faced in rice cultivation in *Hevea* yards is pests and diseases. Table 4 shows the main pests and diseases that attack all tested rice varieties. While weeds do not interfere, as the crown widens, weeds experience a decrease in growth due to limited sunlight. In contrast, at TBM ages 1 and 2, weeds were still the main biological pests.

Table 4. Dominant pests and diseases in the study area

Pest	Disease	weed
<ul style="list-style-type: none"> • False White Lice (<i>Cnaphalocrocis medinalis</i>), • Green Grasshopper (<i>Oxya chinensis</i>), • Walang Sangit (<i>Leptocorisa oratorius</i>), ladybugs, • White-backed Leafhopper (<i>Sogatella furcivera</i> Horvarth) 	<ul style="list-style-type: none"> • Tugro's disease • Blast (<i>Pyricularia</i>, sp), • Bacterial Leaf Blight (<i>X. oryzae</i> pv. <i>Oryzae</i>) 	<ul style="list-style-type: none"> • Riddles • grass (low intensity)



Figure 2. Ongoing pest control

4. CONCLUSION

From the results of this growth observation, the following conclusions were obtained:

1. The growth of the Rindang 1 and Rindang 2 varieties in terms of height gain in the 2 periods (20 and 50 Days After Planting, HST) was very good, namely 44.77 cm and 46.30 cm respectively. This height increase is still equivalent to the height increase in the Overlay Silver variety (44.18 cm).
2. The superior variety Rindang 2 and the local variety Hamparan Perak are potential in terms of the growth in the number of tillers when cultivated in Hevea plantations aged 3 years
3. A number of pests and diseases are projected to be obstacles in rice cultivation in 3-year-old Hevea plantations.

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